

Radio Science Support

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Since 1967 radio scientists have used the DSN 26- and 64-m antenna stations to investigate pulsars, to study the effects of solar corona on radio signals, and to observe radio emissions of X-ray sources. More recently, very long baseline interferometry (VLBI) techniques have been used for high resolution studies of quasars. During the reporting period, several proposals were received for extension of VLBI observations which had reported the startling expansion of quasar 3C279.

I. Introduction

The 26- and 64-m antenna stations of the DSN have been used for several years to support radio science experiments. NASA, JPL, and university scientists have used key DSN facilities whose particular and unique capabilities were required for the performance of the experiments. In order to formalize the method of selecting experiments and experimenters, a Radio Astronomy Experiment Selection (RAES) panel was formed in 1969. Notice of availability of these facilities was placed in professional journals to inform the scientific community that they were available for limited use by qualified radio scientists (Ref. 1). No charge is made for use of the standard DSN facilities and equipment; special equipment, however, must be provided by the experimenters. A summary of all experiments conducted through April 1971 was reported in Ref. 2.

II. Radio Science Operations

Table 1 summarizes the experiments supported since April 1971. The observations at X-band by Clark, Shapiro, and others in June are an extension of the General Relativity VLBI experiment performed in October 1970 and February 1971 between the 64-m antenna at Goldstone DSCC and the MIT Haystack antenna. Additional published findings appeared during this reporting period (Ref. 3).

III. RAES Panel Activities

The RAES Panel received and approved the proposals for experiments shown in Table 2.

References

1. *Bull. Amer. Astronom. Soc.*, Vol. 2, No. 1, p. 177, 1970.
2. Linnes, K. W., Sato, T., and Spitzmesser, D., "Radio Science Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. III, pp. 46-51. Jet Propulsion Laboratory, Pasadena, Calif., June 15, 1971.
3. Whitney, A. R., et al., "Quasars Revisited: Rapid Time Variations Observed Via Very Long Baseline Interferometry," *Science*, Vol. 173, p. 225, July 16, 1971.

Table 1. Radio science experiments involving 64- and 26-m antenna facilities

Experiment	Purpose	Experimenter	DSN Facility	Date
Very long baseline interferometry, X-band	To conduct VLBI survey of radio sources using baseline between Crimean Astrophysical Observatory in the USSR and the NRAO and Goldstone DSCC	J. Broderick, (NRAO) B. Clark (NRAO) M. Cohen (Caltech) D. Jauncey (Cornell University) K. Kellermann (NRAO) L. Matveyenko (Institute for Cosmic Research, USSR) I. Moiseyev (CAO, USSR) V. Vitkevitch (Institute for Cosmic Research, USSR)	DSS 14 (with 43-m antenna at NRAO and 22-m antenna at CAO)	30 May 1971 25 June 1971
Very long baseline interferometry (medium data bandwidth, S-band)	To determine angular size of radio sources	J. Gubbay (University of Adelaide) A. Legg (Space Research Group, WRE) D. Robertson (Space Research Group, WRE) A. Moffet (Caltech) B. Seidel (JPL)	DSS 14 and DSS 41	12 June 1971
Very long baseline interferometry (2295 MHz, NRAO recording terminals)	High resolution studies of extra galactic radio sources	J. Broderick (NRAO) B. Clark (NRAO) M. Cohen (Caltech) D. Jauncey (Cornell University) K. Kellermann (NRAO)	DSS 13 (and NRAO 43-m antenna)	7 August 1971
Quasar structure by X-band VLBI	To monitor time variations and fine structure and apparent position of quasars	T. Clark (GSFC) R. Goldstein (JPL) H. Hinteregger (MIT) C. Knight (MIT) G. Marandino, (University of Maryland) A. Rogers (MIT Haystack Observatory) I. Shapiro (MIT) D. Spitzmesser (JPL) A. Whitney (MIT)	DSS 14 (and MIT Haystack Antenna)	9,19 June 1971

Table 2. Recent experiments approved by the RAES panel

Experiment	Purpose	Experimenter	DSN facility
Spiral galaxy mapping	To study galaxies with anomalous red shifts and their possible association with radio sources	H. Arp (Caltech)	DSS 14
Quasar structure by X-band VLBI	To monitor time variations and fine structure and apparent position of quasars	T. Clark (GSFC) R. Goldstein (JPL) H. Hinteregger (MIT) C. Knight (MIT) G. Marandino (University of Maryland) A. Rogers (MIT Haystack Observatory) I. Shapiro (MIT) D. Spitzmesser (JPL) A. Whitney (MIT)	DSS 14 (and MIT Haystack antenna)
X-band VLBI	Repeat of earlier observations to search for changes in 33 or more sources	J. Broderick (NRAO) B. Clark (NRAO) K. Kellermann (NRAO) D. Jauncey (Cornell University) M. Cohen (Caltech) D. Shaffer (Caltech)	DSS 14 (and MIT Haystack antenna)